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RETIRING SENATOR OF NEW YORK STATE. (*See page* 224.)

COBBLING HUMANITY.

Of all the feats of modern surgery, perhaps those that excite the wonder of the public most are the repairs executed on the body. In reality such operations require comparatively little skill, and, as the question of life or death is not involved in them, they are of far less importance than the achievements of abdominal surgery, or critical exploration into the brain. In the abdomen or the brain the surgeon works with the hope that the operation may save the life of the patient, and the certainty that the slightest mishap or error will insure death; yet he is obliged to use the utmost delicacy, to execute with the utmost despatch, and to ignore hesitation or deliberation. He is in the position of an explorer by night. Nevertheless, if he succeed, his skill does not call attention to itself by after-effects; it has simply restored the man to what he was before disease threatened him with death. But when an individual has met with an accident that affects his appearance, and he is afterward cobbled so that his original looks are restored with more or less approximation to perfection, the change can be perceived by any one.

Among operations which may be classed as cobbling humanity are the various processes of transplanting and of grafting skin, nerves, and bone. Some remarkable results have been attained in this department of surgery. The story published in THE ILLUSTRATED AMERICAN of the transplanting of two sets of human eyes, and which was entitled "With Each Other's Eyes," goes only a little way beyond the record of what surgeons have actually accomplished outside of novels. As surgeons have by no means developed this art to its full extent, it may appear in the course of time that the author of the story was only anticipating events. Up to the present time no human eyes have been transplanted, but the attempt has been made, unsuccessfully, to replace a lost human eye by the eye of a rabbit. The chief field of operation of cobbling surgery, however, has been in repairing the human features and in straightening deformed limbs.

The possibility of nerve-grafting has been proved. In such cases sensation has been restored after intervals of from thirty-six hours to eighteen days, while the motor power has been recovered somewhat later. These cases have generally shown the effects of cobbling, however, the repaired nerve not having the same activity as the original. At the recent Surgical Congress at Berlin, Professor Glück made an address on the implantation of catgut, ivory, and other substances between the ends of severed nerves, bones, and tendons, in lieu of lost substance. He addressed himself especially to the question whether the supplemented organ would work satisfactorily; whether, for instance, a nerve would ever be able to perform its function after a lost portion had been replaced by an artificial implantation. Some surgeons were disposed to poke fun at suggestions of implantation, and to make sarcastic references to the possibility of replacing diseased parts of the human body by clippings from animals. Professor Glück made a practical answer to such doubters by exhibiting cases in which operations had been performed. Several patients who had suffered severe injuries to the tendons of the hand, and in whose hands bundles of catgut had been inserted between the ends of the tendons, showed that their hands had recovered the power of motion to a satisfactory extent. He also exhibited a rooster in whose thigh a nerve had been pieced out, and he proved by electrical stimulation that the conductibility of the nerve-fibres had been restored.

The employment of bone-grafts for the purpose of filling cavities such as are left in a bone by disease, and of replacing bone lost through accident, is still uncommon; but the success of the method has been demonstrated. Professor Lenn, of Chicago, has been one of the foremost investigators of the subject, and was first to advocate the use of decalcified bone shavings, which have been found to assist the healing of the wound. One of the most successful instances of bone-grafting is that recorded by Dr. Macewen, who succeeded in restoring continuity of bone between the epiphyses of a humerus in a boy who had lost the diaphysis of that bone a year previously. In this case the grafts were taken from children in whom it was necessary to remove a wedge-shaped piece from the tibia for deformity. Success has also been obtained in the employment of animal bone-grafts by several surgeons.

Skin-grafting is one of the cobbling operations performed most extensively and successfully. Dr. Charles McBurney read a paper before the New York Academy of Medicine recently, describing his modification of the method originally suggested by Thiersch. No antiseptics were used, the only solution employed being one of common salt in water. The parts were thoroughly washed with soap and water, and all hair was removed by careful shaving. A smooth, healthy surface was then produced on which the grafts might be placed. The grafts themselves consisted of thin slices of skin removed by shaving parallel to the surface. The author had found a broad razor with a very delicate edge the best instrument for this purpose. The most convenient points from which to take grafts were the front and outer part of the thigh, and the outer surface of the upper arm. Four or five inches in length and an inch in width were about the dimensions of a first-rate graft. After the grafts had been laid on the surface, they were covered with protective tissue, compresses, and bandages. The healing was complete in from one week to two months. Dr. McBurney said that those not familiar with the method would be surprised to see how perfectly and successfully these grafts could be applied. Among the cases he described was one in which a large area of lower jaw had been covered. In another case a surface several inches in diameter on the back of the forearm included a number of tendons. The grafts applied were more than usually successful, and complete healing was rapidly attained. In regard to the permanency of healing, his experience showed it to be remarkably good. The grafts used by Dr. McBurney were very thin. Dr. P. A. Morrow, on the other hand, has used much thicker grafts, including the entire derma and subcutaneous tissue. He thus repaired a scar of long-standing on the head of a patient, using a small punch or trephine to take buttons of material from another part of the head. From another individual he has taken portions of scalp a quarter of an inch thick, and after having been transplanted the grafts continued to bear hair luxuriously. His experience in this respect has suggested the question whether it would not be possible to transplant grafts of tissue to produce growth of hair and cure baldness. So far as is known, no such experiment has been reported yet, one reason undoubtedly being the difficulty of obtaining material. In the first case described by Dr. Morrow it was almost impossible to discover the line of demarcation after healing.

Human skin is not necessary to such operations; the skin of animals will do as well. A case was reported not long ago in which the skin of a puppy-dog was employed. The patient was a boy who had thrust his leg accidentally into a boiling mixture, and had lost all the skin from the ankle to the knee. As a sufficient quantity of human skin could not be obtained to cover so large an area, it was determined to resort to an animal, and a greyhound seven days old, and black and white in color, was chosen. The dog having been killed with chloroform, the skin on the anterior abdominal wall and flanks was shaved, removed, and cut into strips measuring about six inches long by half an inch broad. These were firmly pressed upon the prepared surface of the boy's leg in the long axis. Smaller grafts about an inch square were used to fill the spaces left between the larger ones. A considerable area over the inner side of the knee remained bare, and to cover it the skin from the puppy's tail was used unshaved. With a few exceptions the grafts did well, and the gaps were easily filled. After seven months, the leg was as useful as ever. There was absolutely no contraction in the cicatrix, except where the tail-skin was planted, and there it was very slight. The color of the skin was uniform and very similar to that of the normal skin. There was no evidence of any development of hair or of cutaneous secretion. The ordinary sensation was as good as that of the other leg, and the temperature of the two was the same.

The present high standard of orthopedic surgery is due

very largely to the energy and mechanical skill of an American surgeon, Dr. Lewis A. Sayre, of New York, who may properly be regarded as the father of the present method of treatment in this department of surgery. He has had many coadjutors in the work, and at present great success is obtained even in the most unfavorable surroundings. Orthopedy is peculiarly a branch of surgery which concerns the poor, for, in a list of one hundred cases of osteotomy published recently, the deformity, in nearly every case, was ascribed to rickets, and the degree of deformity was described as having been brought about chiefly by parental neglect. Through the devotion to science of surgeons, patients in such circumstances have received treatment according to the most approved methods, and incalculable good has been done both in the way of relieving deformities and of facilitating self-support. The straightening of limbs is one of the chief aims of this branch of surgery. In the more difficult cases it is necessary to break or to cut the bones, and it is one of the glories of modern surgical science that, however painful and shocking this process may seem when first described, it is conducted with an almost complete absence of suffering to the patient. A case is on record of a boy whose deformities made him an object of pity to all who beheld him, but who, by skilful surgery, is now able to walk about and earn his living, while there is no outward sign that he was ever deformed. To accomplish this transformation he went through operations the description of which read like an account of the tortures inflicted on a victim of the Inquisition; yet the boy hardly felt pain, such is the beneficent power of chloroform. No fewer than six compound fractures of bones were made in his case. The surgeon began by fracturing both thighs and removing small wedges, and, at the same sitting, doing simple osteotomy at the upper third of the tibiæ. Two months afterward he again divided the tibiæ, removing wedge-shaped pieces at the junction of the lower and middle third. Happily, cure is not so difficult in all cases, splints, bandages, surgical appliances, and other means of a milder character than osteotomy being effective. A case that excited much interest in England at the time it was published was that of a sailor. His right thigh had been broken in a fall, and, by some mischance, had healed so badly that it was bent in the middle at a right angle. The patient could walk only with crutches, the right leg hanging useless a little distance outside the line of the body, and the foot being five or six inches from the ground. The movements of the hip-joint were found to be free; the knee was quite stiff, and the movements of the foot were limited. The alternative of an amputation at the thigh or of an attempt to straighten the leg by refracturing the bone was offered to the sailor, who chose the latter. The patient having been anæsthetized, an incision two inches in length was made in the limb over the prominence, and a three-quarter-inch carpenter's chisel was applied to the bone and hammered cautiously with a mallet until it was felt to be in the softer central portion of the bone. The chisel was then driven toward the anterior, and afterward toward the posterior, surface of the bone. The bone could then be broken with the hands, after which a wedge-shaped piece was sawn off the upper fragment. When this had been accomplished the leg was brought in proper position and put up in a splint. A few days after the operation an extension apparatus was applied to the foot, and the recovery went on rapidly subsequently. When the patient was discharged the right leg was less than two inches shorter than the left. At first he used crutches, but he was soon graduated to two sticks, and six months afterward he reported that he could walk several miles comfortably with a stick. The lameness seen in his gait is not very noticeable considering the shortening.

For two reasons public attention has been drawn to an operation attempted recently in the Charity Hospital, in New York City, in which the bone of a boy's leg was supplemented by a dog's bone. Not only was the experiment of a sensational character, but the question of vivisection and cruelty to animals was involved. The object of the operation was to fill a bony gap. The bone of the boy's leg having been laid bare, and one leg of the dog having been similarly treated, the dog's bone was laid in the cavity of the boy's bone, and the two bones were bound together in the hope that they would unite. To prevent a failure of the operation through the dog moving, the animal and the boy's legs were encased in plaster of Paris, and, as an additional precaution, hypodermic injections of morphine were given at intervals. Everything was done to make both dog and boy as comfortable as possible, and when it was judged that union between the two bones had taken place, the plaster of Paris was removed and the dog's leg amputated. Interesting as this operation may seem in some respects, surgeons are by no means agreed as to its utility. Some of the best authorities think that it involves unnecessary dangers and complications, and are disposed to consider it less advantageous than the method of bone-grafting by the use of decalcified bone chips, which has already been described. It is further argued that it is unwise to risk arousing an antivivisection agitation, however laudable may be the end sought.

The operations described are intended only to give an idea of the great scope of modern reparative surgery; a complete list of all its varied and wonderful achievements would be impossible.

As has been intimated, it is not in new operations alone that humanity has gained; old ones have been robbed of many of their terrors. This change is well shown in cataract operations. According to the old practice, which still obtains in many hospitals, the two eyes of the patient were bandaged, and he was secluded in a dark room for two weeks after the operation, being obliged to lie in bed on his back, lest by moving he should displace the dressing, and thereby lose his eyesight. It needed very much faith on the part of the nervous, anxious patient to go through the very long week of blindfolding, counting the days, hours, and minutes before liberation when he could hope to see. Bad as this was in those who were blind in both eyes, it was vastly more so to those who still possessed a useful eye, and the thought of this confinement often deterred timid persons from submitting to an operation for the restoration of sight. At present almost all the old restrictions have been done away with. The heavy bandages and compresses have been replaced by a piece of soft diaphanous silk isinglass-plaster, the useful eye is left uncovered, the patient is under little restraint, the room is no longer kept entirely dark, and the operation is much more successful as a rule than under the old methods of treatment.

Electricity has been of great service in modern surgery; its proper place, however, has not been fully determined yet. One of the interesting exhibitions at the International Medical Congress at Berlin, last summer, concerned Edison's experiments in the domain of electric therapeutics. The aim of the experiments was the cure of gouty concretions by means of electric endosmosis, or the transportation of medicaments by an electric current. They were based on the fact that the endosmotic exchange of different solutions of salt through an animal membrane is greatly accelerated when an electric stream goes through the fluids and the membrane. To similar previous experiments with lithia salts Edison has added new ones. In illustration of the theory, he placed in one hand of a healthy man a solution of chlorinated lithia, and in the other one of chlorinated soda, and dipped the negative pole of a battery into the latter, and the positive pole into the former. The treatment lasted two hours daily, and eleven hours in all. It was proved by spectroscopic examination that considerable quantities of lithia passed into the man's body. Edison then undertook the treatment of a man seventy-three years old, who had contracted gout by sleeping in a damp bed. The joints, except the knees, were severely swollen with calcareous concretions, a certain degree of nervous congestion appeared in his face, and he suffered intense pain in various parts of his body. The gait was difficult and painful. Edison again used solutions of lithia and common salt, and an electric current was passed through the patient four hours a day for six days. The pain ceased on the first day. At the end of the treatment the calcareous concretions had been diminished greatly. The experiments seem to prove the applicability of electric endosmosis to some forms of gout.